CLAIMS

1. In a Java computing environment, an internal class representation suitable for use by a Java virtual machine, said internal class representation comprising:

a reference identifier having one or more entries, wherein each of said one or more entries correspond to a field of a Java object; and

wherein each of said one or more entries can be used to indicate whether corresponding fields of said Java object is a reference to another Java object.

2. An internal class representation as recited in claim 1,

wherein said reference identifier is an array of bytes; and

wherein the size of said reference identifier is the same as the number of fields of said Java object.

3. An internal class representation as recited in claim 1, wherein an entry of said array of bytes is set to zero to indicate that the corresponding field of said Java object is not a reference to another Java object.

4. An internal class representation as recited in claim 1, wherein an entry of said array of bytes is set to a predetermined non-zero value to indicate that the corresponding field of said Java object is not a reference to another Java object.

5. An internal class representation as recited in claim 4, wherein said predetermined non-zero value is equal to 1.

6. An internal class representation as recited in claim 1,

        wherein an entry of said array of bytes is set to zero to indicate that the corresponding field of said Java object is not a reference to another Java object; and

5   wherein an entry of said array of bytes is set to a predetermined non-zero value to indicate that the corresponding field of said Java object is not a reference to another Java object.

7. An internal class representation as recited in claim 6, wherein said array
10 of bytes is allocated and set to appropriate values during load time.

8. An internal class representation as recited in claim 1, wherein said reference identifier is allocated during load time.

15 9. A method for generating a reference identifier for a Java object, said method comprising:

        reading a class file associated with a Java object;

        identifying fields of said Java object that are references;

        allocating a reference identifier for said Java object; and

20   wherein said reference identifier indicates which fields of said Java object are references.

10. A method as recited in claim 9, wherein said method is performed at load time by a virtual machine.

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11. A method as recited in claim 9,

        wherein said reference identifier is an array of bytes; and

        wherein the size of said reference identifier is the same as the number of fields of said Java object.

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12. A method as recited in claim 9, wherein an entry of said array of bytes is set to zero to indicate that the corresponding field of said Java object is not a reference to another Java object.

13. A method as recited in claim 9, wherein an entry of said array of bytes is set to a predetermined non-zero value to indicate that the corresponding field of said Java object is not a reference to another Java object.

14. A method for determining whether a field of a Java object is a reference to another Java object, said method comprising:

identifying the internal class representation for the Java object;

identifying a reference indicator in said internal class representation;

reading a portion of said reference indicator that represents said field of said Java object; and

determining whether the value stored in said portion of said reference indicator is equal to a predetermined value.

15. A method as recited in claim 14, wherein said method is performed by a Java virtual machine at runtime.

16. A method as recited in claim 14,

wherein said reference identifier is an array of bytes; and

wherein the size of said reference identifier is the same as the number of fields of said Java object.

17. A method as recited in claim 14, wherein said predetermined value can be 1 or zero.

18. A computer readable media including computer program code for an internal class representation suitable for use by a Java virtual machine, said computer readable media comprising:

computer program code for a reference identifier having one or more entries, wherein each of said one or more entries correspond to a field of a Java object; and

wherein each of said one or more entries can be used to indicate

5   whether corresponding fields of said Java object is a reference to another Java object.

19. A computer readable media as recited in claim 18,

wherein said reference identifier is an array of bytes; and

10   wherein the size of said reference identifier is the same as the number of fields of said Java object.

20. A computer readable media as recited in claim 19, wherein said array of bytes is allocated and set to appropriate values during load time.